

Teacher's Scoring Guide



Grade 7
Science

Fall 2007

Indiana Statewide Testing for Educational Progress



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INTRODUCTION

During the fall of 2007, Indiana students in grades 3 through 10 participated in the administration of *ISTEP+*. The test for *ISTEP+* Fall 2007 consisted of a multiple-choice section and an applied skills section. For the fall testing, the multiple-choice section was machine-scored. The applied skills section, which consisted of open-ended questions, was hand-scored.

The test results for both the multiple-choice and the applied skills sections were returned to the schools in late November 2007. Copies of student responses to the open-ended questions were returned to the schools in early December 2007. It is the expectation of the Indiana Department of Education that schools will take this opportunity to invite students and parents to sit down with teachers to discuss the results. To support this endeavor, the Indiana Department of Education has prepared the following *Teacher's Scoring Guide*. The purpose of this guide is to help teachers to:

- understand the methods used to score the *ISTEP+* Fall 2007 applied skills section, and
- discuss and interpret these results with students and parents.

In order to use this guide effectively, you will also need the Student Report and a copy of the student's work.

There are three scoring guides for Grade 7, English/Language Arts, Mathematics, and Science. In this Science guide, you will find:

- an introduction,
- a list of the Science Grade 6 Indiana Academic Standards,*
- rubrics (scoring rules) used to score the open-ended questions,
- anchor papers that are actual examples of student work (transcribed in this guide for clarity and ease of reading), and
- descriptions of the ways in which the response meets the rubric criteria for each of the score points.

When you review the contents of the scoring guide, keep in mind that this guide is an overview. If you have questions, write via e-mail (istep@doe.state.in.us) or call the Indiana Department of Education at (317) 232-9050.

* Because *ISTEP+* is administered early in the fall, the Grade 7 Science assessment is based on the academic standards through Grade 6.

INTRODUCTION TO THE SCIENCE APPLIED SKILLS SECTION

The applied skills section that students responded to this past fall in Grade 7 allowed the students to demonstrate their understanding of Science in a variety of ways, such as interpreting models, making conclusions, analyzing data, making predictions, explaining results, or applying concepts.

STRUCTURE

The applied skills section for Grade 7 Science was given in Test 11, which consisted of eight open-ended questions.

SCORING

Each open-ended question was scored according to its own rubric. A rubric is a description of student performance that clearly articulates the requirements for each of the score points. Scoring rubrics are essential because they ensure that all papers are scored objectively. Each rubric for this administration of the *ISTEP+* Grade 7 Science assessment has a maximum possible score of two score points.

NOTE: Images of the questions and student work have been reduced to fit the format of this guide.

Rubrics are established prior to testing to describe the performance criteria for each score point. The performance criteria determine the number of score points possible for each question. This process ensures that all responses are judged objectively.

1. Students should not be penalized for:

- spelling or grammar errors
- using abbreviations; for example, *cm* or *centimeters* would be acceptable

2. Students should be given credit for:

- answers not written on the answer line (however, in some cases, because a question may consist of different parts, placement of an answer on the answer line is necessary to determine to which part the student intended to respond)

CONDITION CODES

If a response is unscorable, it is assigned one of the following condition codes:

A Blank/No response/Refusal

B Illegible

C Written predominantly in a language other than English

D Insufficient response/Copied from text

E Response not related to test question or scoring rule

SCIENCE GRADE 6

INDIANA ACADEMIC STANDARDS

☐ **The Nature of Science and Technology**

Students design investigations. They use computers and other technology to collect and analyze data; they explain findings and can relate how they conduct investigations to how the scientific enterprise functions as a whole. Students understand that technology has allowed humans to do many things, yet it cannot always provide solutions to our needs.

☐ **Scientific Thinking**

Students use computers and other tools to collect information, calculate, and analyze data. They prepare tables and graphs, using these to summarize data and identify relationships.

☐ **The Physical Setting**

Students collect and organize data to identify relationships between physical objects, events, and processes. They use logical reasoning to question their own ideas as new information challenges their conceptions of the natural world.

☐ **The Living Environment**

Students recognize that plants and animals obtain energy in different ways, and they can describe some of the internal structures of organisms related to this function. They examine the similarities and differences between humans and other species. They use microscopes to observe cells and recognize cells as the building blocks of all life.

☐ **The Mathematical World**

Students apply mathematics in scientific contexts. They use mathematical ideas, such as relations between operations, symbols, shapes in three dimensions, statistical relationships, and the use of logical reasoning in the representation and synthesis of data.

☐ **Historical Perspectives**

Students gain understanding of how the scientific enterprise operates through examples of historical events. Through the study of these events, they understand that new ideas are limited by the context in which they are conceived, are often rejected by the scientific establishment, sometimes spring from unexpected findings, and grow or transform slowly through the contributions of many different investigators.

☐ **Common Themes**

Students use mental and physical models to conceptualize processes. They recognize that many systems have feedback mechanisms that limit changes.

Test 11—Question 1: The Nature of Science and Technology

1 Describe TWO different uses of an X-ray machine.

- 1) _____

- 2) _____

Key Elements:

Any two of the following:

- It can allow people to indirectly see inside an object/person.
- It can allow diagnosis of injury/illness without surgery (which also lowers risk of infection).
- It can allow faster diagnosis of injury/illness.
- other reasonable use of an X-ray machine

Rubric:

- | | |
|-----------------|------------------|
| 2 points | Two key elements |
| 1 point | One key element |
| 0 points | Other |

SCORE POINT 2	
1	Describe TWO different uses of an X-ray machine.
1)	To find broken bones. _____
2)	To find miscellaneous items in bodies _____

**Test 11—Question 1
Score Point 2**

This response correctly describes two different uses of an X-ray machine. The response receives a Score Point 2.

SCORE POINT 1	
1	Describe TWO different uses of an X-ray machine.
1)	They let you know if someone has a broken bone. _____
2)	They are a type of ray in the sky. _____

**Test 11—Question 1
Score Point 1**

This response correctly describes only one use of an X-ray machine. Therefore, this response receives a Score Point 1.

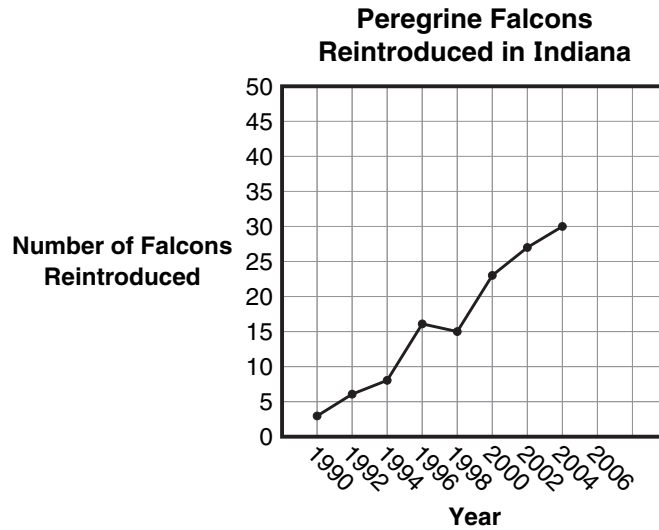
SCORE POINT 0	
1	Describe TWO different uses of an X-ray machine.
1)	It is big. _____
2)	They use for X ray _____

**Test 11—Question 1
Score Point 0**

This response does not correctly describe any uses of an X-ray machine. Therefore, this response receives a Score Point 0.

Test 11—Question 2: The Mathematical World

- 2** The graph below shows the number of peregrine falcons that have been reintroduced to the wild as part of a statewide program in Indiana.



Describe the overall trend in the number of falcons reintroduced from 1990 to 2004.

Using the information in the graph, predict the number of falcons reintroduced in 2006.

Explain how you made this prediction.

Key Elements:

- Overall, the number of falcons reintroduced increased over time.

AND

Both of the following:

- any number between 32 and 40
- any reasonable explanation of using the data for the past years to calculate the increase between years to find a pattern/average/range in order to predict the value for 2006

Rubric:

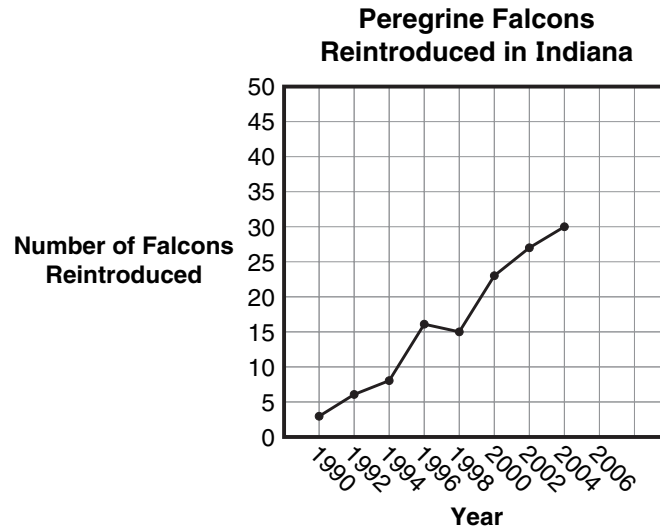
2 points	Two key elements
1 point	One key element
0 points	Other

Test 11—Question 2
Score Point 2

This response correctly describes the overall trend shown in the graph. The student correctly predicts the number of falcons reintroduced in 2006 and correctly explains how the prediction was made. The response receives a Score Point 2.

SCORE POINT 2

- 2** The graph below shows the number of peregrine falcons that have been reintroduced to the wild as part of a statewide program in Indiana.



Describe the overall trend in the number of falcons reintroduced from 1990 to 2004.

The overall trend is mostly an increase of reintroduction
between 1990 and 2004.

Using the information in the graph, predict the number of falcons reintroduced in 2006.

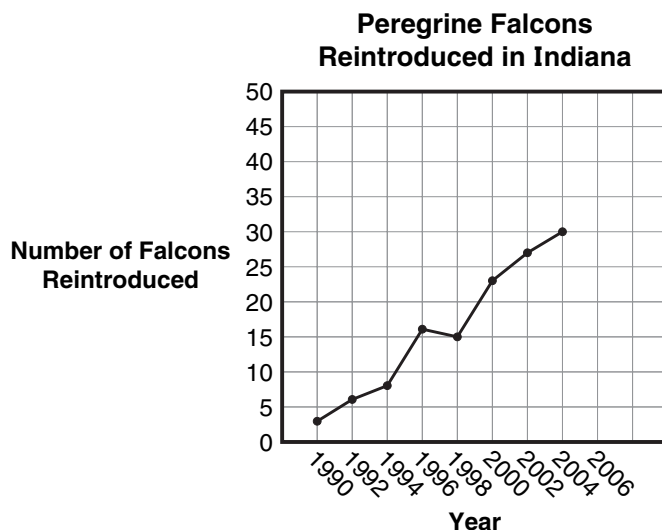
33

Explain how you made this prediction.

Between years, the usual amount of increase is 2 or 3. I chose 3.

SCORE POINT 1

- 2** The graph below shows the number of peregrine falcons that have been reintroduced to the wild as part of a statewide program in Indiana.



Describe the overall trend in the number of falcons reintroduced from 1990 to 2004.

The overall trend would have to be that they increased.

Using the information in the graph, predict the number of falcons reintroduced in 2006.

16 falcons

Explain how you made this prediction.

I just found the average number of falcons total.

Test 11—Question 2 Score Point 1

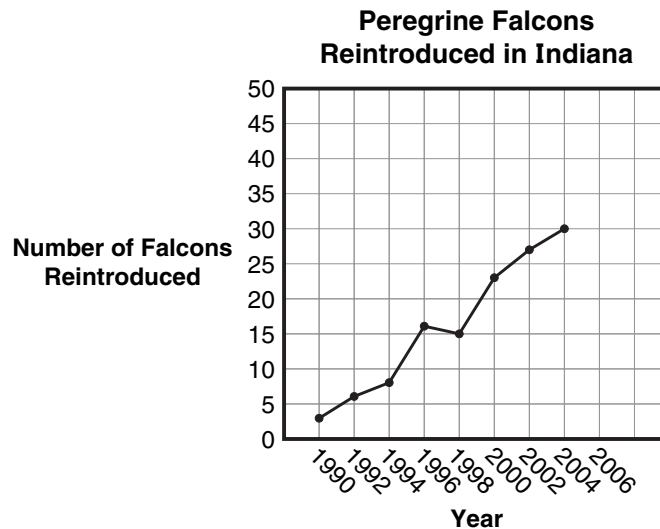
This response correctly describes the overall trend shown in the graph. However, the student incorrectly predicts the number of falcons reintroduced in 2006 and explains an incorrect method to make the prediction. Therefore, this response receives a Score Point 1.

Test 11—Question 2
Score Point 0

This response incorrectly describes the overall trend shown in the graph. The student incorrectly predicts the number of falcons reintroduced in 2006 and gives an insufficient explanation of the method used to make the prediction. Therefore, this response receives a Score Point 0.

SCORE POINT 0

- 2** The graph below shows the number of peregrine falcons that have been reintroduced to the wild as part of a statewide program in Indiana.



Describe the overall trend in the number of falcons reintroduced from 1990 to 2004.

Thats a 15 diffiernt year combonashion

Using the information in the graph, predict the number of falcons reintroduced in 2006.

17 year

Explain how you made this prediction.

all I did was count and got my anwser

Test 11—Question 3: Common Themes

3 The list below describes interactions between several populations living in an ecosystem.

- Dragonflies eat mosquitoes.
- Frogs eat both dragonflies and mosquitoes.
- Snakes eat frogs.
- Hawks eat both snakes and frogs.

Describe how an increase in one of the other populations would affect the FROG population.

Describe a change in a DIFFERENT population that would have the OPPOSITE effect on the frog population.

Key Elements:

Any one the following:

- If the mosquito/dragonfly population increased resulting in more food for frogs, (then the frog population would increase).
- If the snake/hawk population increased resulting in more predators for frogs, (then the frog population would decrease).

AND

Any one of the following:

- If the snake/hawk population increased resulting in more predators for frogs, (then the frog population would decrease).
- If the mosquito/dragonfly population increased resulting in more food for frogs, (then the frog population would increase).

NOTE: In order to receive credit for both key elements, the populations given in the two responses should be different and should cause opposite effects on the frog population.

Rubric:

2 points	Two key elements
1 point	One key element
0 points	Other

SCORE POINT 2

- 3** The list below describes interactions between several populations living in an ecosystem.

- Dragonflies eat mosquitoes.
- Frogs eat both dragonflies and mosquitoes.
- Snakes eat frogs.
- Hawks eat both snakes and frogs.

Describe how an increase in one of the other populations would affect the FROG population.

An increase of dragonflies and mosquitos would make in
increase in the frog population.

Describe a change in a DIFFERENT population that would have the OPPOSITE effect on the frog population.

An increase of snakes and hawks would mean a decrease of
frogs.

Test 11—Question 3 Score Point 2

This response correctly describes how a change in one of the other animal populations would affect the frog population. The student correctly describes a change in a different population that would have the opposite effect on the frog population. The response receives a Score Point 2.

SCORE POINT 1

- 3** The list below describes interactions between several populations living in an ecosystem.

- Dragonflies eat mosquitoes.
- Frogs eat both dragonflies and mosquitoes.
- Snakes eat frogs.
- Hawks eat both snakes and frogs.

Describe how an increase in one of the other populations would affect the FROG population.

Increase of snakes. Frogs will die faster.

Describe a change in a DIFFERENT population that would have the OPPOSITE effect on the frog population.

less snakes they wouldn't die as fast.

Test 11—Question 3 Score Point 1

This response correctly describes how a change in one of the other animal populations would affect the frog population. However, the student does not describe a change in a different population that would have the opposite effect on the frog population (instead the student describes the opposite change in the same population). Therefore, this response receives a Score Point 1.

Test 11—Question 3
Score Point 0

This response gives an insufficient description of how a change in one of the other animal populations would affect the frog population (because the other population is not identified).

The student also gives an insufficient description of how a change in a different population would have the opposite effect on the frog population (because the type of change in the dragonfly population is not specified). Therefore, this response receives a Score Point 0.

SCORE POINT 0

3 The list below describes interactions between several populations living in an ecosystem.

- Dragonflies eat mosquitoes.
- Frogs eat both dragonflies and mosquitoes.
- Snakes eat frogs.
- Hawks eat both snakes and frogs.

Describe how an increase in one of the other populations would affect the FROG population.

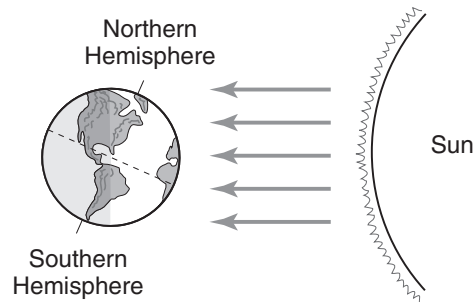
An increase in one of the other populations would affect the frog population because there would more of them to eat more frogs.

Describe a change in a DIFFERENT population that would have the OPPOSITE effect on the frog population.

A change in the draggnflies population would create more food for the frogs.

Test 11—Question 4: The Physical Setting

- 4** The diagram below shows how Earth's axis of rotation is tilted at a certain time of year.



Note: The figures are not drawn to scale.

Explain why the tilt shown in this diagram results in the Northern Hemisphere and Southern Hemisphere receiving different amounts of heat.

Describe how the seasons on Earth would be different if Earth's axis of rotation were NOT tilted.

Key Elements:

Any one of the following:

- The Northern Hemisphere would receive more direct/intense sunlight.
- The Northern Hemisphere would receive more hours of daylight.

AND

- There would be no seasonal changes in weather/no seasons.

Rubric:

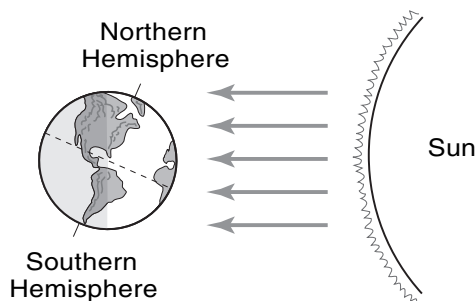
2 points	Two key elements
1 point	One key element
0 points	Other

Test 11—Question 4
Score Point 2

This response correctly explains why the tilt of Earth's axis of rotation results in the Northern Hemisphere and Southern Hemisphere receiving different amounts of heat. The student correctly describes how the seasons on Earth would be different if the Earth's axis of rotation were not tilted (i.e., "For Indiana, it would always be spring" implies that there would be no seasonal changes and also correctly describes the general conditions that would exist in Indiana). The response receives a Score Point 2.

SCORE POINT 2

- 4** The diagram below shows how Earth's axis of rotation is tilted at a certain time of year.



Note: The figures are not drawn to scale.

Explain why the tilt shown in this diagram results in the Northern Hemisphere and Southern Hemisphere receiving different amounts of heat.

More of the Northern Hemisphere is exposed to sunlight and heat.

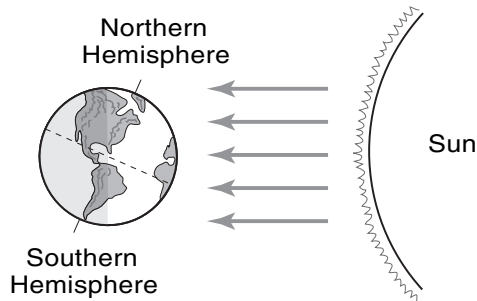
Less of the Southern Hemisphere is exposed to sunlight and heat.

Describe how the seasons on Earth would be different if Earth's axis of rotation were NOT tilted.

For Indiana, it would always be Spring.

SCORE POINT 1

- 4 The diagram below shows how Earth's axis of rotation is tilted at a certain time of year.



Note: The figures are not drawn to scale.

Explain why the tilt shown in this diagram results in the Northern Hemisphere and Southern Hemisphere receiving different amounts of heat.

The Northern Hemisphere is actually closer to the sun.

Describe how the seasons on Earth would be different if Earth's axis of rotation were NOT tilted.

Every region would have only one season.

Test 11—Question 4 Score Point 1

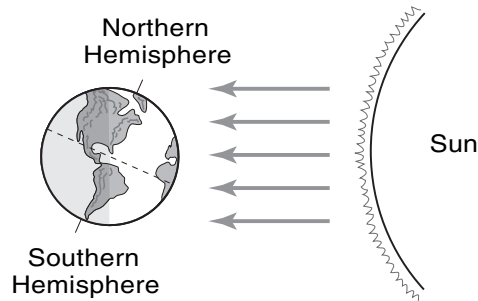
This response incorrectly explains why the tilt of Earth's axis of rotation results in the Northern Hemisphere and Southern Hemisphere receiving different amounts of heat. However, the student correctly describes how the seasons on Earth would be different if the Earth's axis of rotation were not tilted. Therefore, this response receives a Score Point 1.

Test 11—Question 4
Score Point 0

This response incorrectly explains why the tilt of Earth's axis of rotation results in the Northern Hemisphere and Southern Hemisphere receiving different amounts of heat. The student incorrectly describes how the seasons on Earth would be different if the Earth's axis of rotation were not tilted. Therefore, this response receives a Score Point 0.

SCORE POINT 0

- 4** The diagram below shows how Earth's axis of rotation is tilted at a certain time of year.



Note: The figures are not drawn to scale.

Explain why the tilt shown in this diagram results in the Northern Hemisphere and Southern Hemisphere receiving different amounts of heat.

The Southern is cool. The Northern is hot.

Describe how the seasons on Earth would be different if Earth's axis of rotation were NOT tilted.

It would be summer all year.

Test 11—Question 5: The Physical Setting

5 Fresh water is a resource that should be conserved and protected from pollution.

Give ONE specific example of how people can conserve fresh water.

Give ONE specific example of how fresh water can become polluted by people.

Key Elements:

Any one of the following:

- take shorter showers
- turn off water while brushing teeth/washing dishes
- restrict watering of lawn/landscaping
- fix leaky pipes/faucets
- install low-flow toilets/faucets/showerheads
- other reasonable specific example of how people can conserve fresh water

AND

Any one of the following:

- disposing of trash/chemicals in or near freshwater sources
- waste water flowing directly into freshwater sources (e.g., sewage overflows)
- fertilizer/herbicide/pesticide runoff entering freshwater sources
- other reasonable specific example of how fresh water can become polluted by people

Rubric:

- | | |
|-----------------|------------------|
| 2 points | Two key elements |
| 1 point | One key element |
| 0 points | Other |

Test 11—Question 5
Score Point 2

This response gives a correct example of how people can conserve fresh water. The student gives a correct example of how fresh water can become polluted by people. The response receives a Score Point 2.

SCORE POINT 2

5 Fresh water is a resource that should be conserved and protected from pollution.

Give ONE specific example of how people can conserve fresh water.

People can take shorter showers.

Give ONE specific example of how fresh water can become polluted by people.

Some people dump sewage in fresh water.

Test 11—Question 5
Score Point 1

This response gives an incorrect example of how people can conserve fresh water. However, the student gives a correct example of how fresh water can become polluted by people. Therefore, this response receives a Score Point 1.

SCORE POINT 1

5 Fresh water is a resource that should be conserved and protected from pollution.

Give ONE specific example of how people can conserve fresh water.

They can bottle it.

Give ONE specific example of how fresh water can become polluted by people.

By spilling oil in water.

SCORE POINT 0

5 Fresh water is a resource that should be conserved and protected from pollution.

Give ONE specific example of how people can conserve fresh water.

It taste better then some water.

Give ONE specific example of how fresh water can become polluted by people.

Its better for you.

**Test 11—Question 5
Score Point 0**

This response gives an incorrect example of how people can conserve fresh water and an incorrect example of how fresh water can become polluted by people. Therefore, this response receives a Score Point 0.

Test 11—Question 6: The Living Environment

6 Describe ONE function of nerve cells in the body.

Explain how muscle cells in the body interact with nerve cells.

Key Elements:

Any one of the following:

- Nerve cells sense stimuli (e.g., light, sound, etc.).
- Nerve cells send signals (to or from brain/spinal cord).
- Nerve cells process/store information.

AND

- Muscle cells move/contract/relax in response to signals from nerve cells.

Rubric:

2 points Two key elements

1 point One key element

0 points Other

SCORE POINT 2	
6	Describe ONE function of nerve cells in the body. <div> <div>To control movement</div> <div></div> </div>
	Explain how muscle cells in the body interact with nerve cells. <div> <div>nerve cells tell muscle cells what to do.</div> <div></div> </div>

Test 11—Question 6 Score Point 2

This response correctly describes a function of nerve cells. The student correctly explains how muscle cells interact with nerve cells. The response receives a Score Point 2.

SCORE POINT 1	
6	Describe ONE function of nerve cells in the body. <div> <div>seeing</div> <div></div> </div>
	Explain how muscle cells in the body interact with nerve cells. <div> <div>cause you can feel</div> <div></div> </div>

Test 11—Question 6 Score Point 1

This response correctly describes a function of nerve cells. However, the student incorrectly explains how muscle cells interact with nerve cells. Therefore, this response receives a Score Point 1.

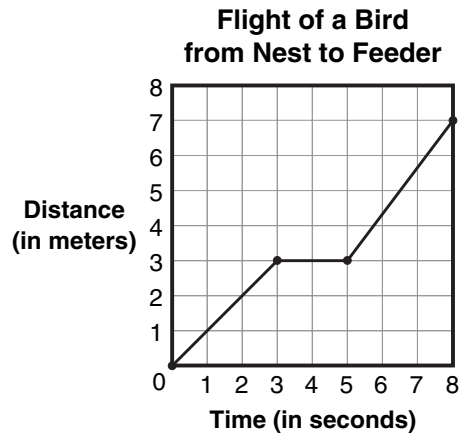
SCORE POINT 0	
6	Describe ONE function of nerve cells in the body. <div> <div>They help with and work with other cells in your body.</div> <div></div> </div>
	Explain how muscle cells in the body interact with nerve cells. <div> <div>They surround your muscles and the nerve cells help with our muscles.</div> <div></div> </div>

Test 11—Question 6 Score Point 0

This response gives an insufficient description of a function of nerve cells. The student also gives an insufficient explanation of how muscle cells interact with nerve cells. Therefore, this response receives a Score Point 0.

Test 11—Question 7: Scientific Thinking

- 7** The graph below shows the time it took for a bird to fly from its nest to a bird feeder.



Using the information in the graph, describe what the bird is doing in the period between 3 seconds and 5 seconds after it left its nest.

What is the speed of the bird, in meters per second, in the first 3 seconds of flight?

Answer _____ meters per second

Key Elements:

Any one of the following:

- The bird stopped moving during that time period.
- The bird is hovering (keeping the distance between the bird and the nest constant).
- The bird is flying in a circle around the nest (keeping the distance between the bird and the nest constant).

AND

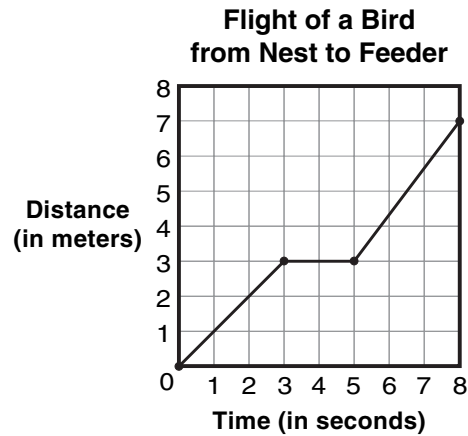
- 1 meter per second

Rubric:

2 points	Two key elements
1 point	One key element
0 points	Other

SCORE POINT 2

- 7** The graph below shows the time it took for a bird to fly from its nest to a bird feeder.



Using the information in the graph, describe what the bird is doing in the period between 3 seconds and 5 seconds after it left its nest.

The bird is staying in one place

What is the speed of the bird, in meters per second, in the first 3 seconds of flight?

Answer 1 meters per second

Test 11—Question 7 Score Point 2

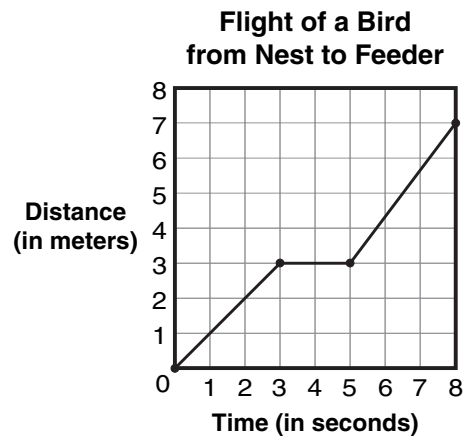
This response correctly describes what the bird is doing in the period between three seconds and five seconds after leaving its nest. The student correctly calculates the speed of the bird during its first three seconds of flight. The response receives a Score Point 2.

Test 11—Question 7
Score Point 1

This response incorrectly describes what the bird is doing in the period between three seconds and five seconds after leaving its nest. However, the student correctly calculates the speed of the bird during its first three seconds of flight. Therefore, this response receives a Score Point 1.

SCORE POINT 1

- 7** The graph below shows the time it took for a bird to fly from its nest to a bird feeder.



Using the information in the graph, describe what the bird is doing in the period between 3 seconds and 5 seconds after it left its nest.

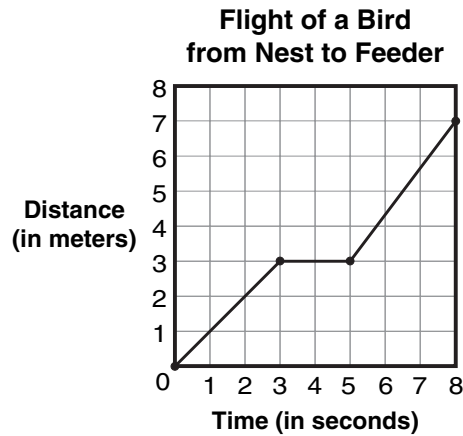
Gliding

What is the speed of the bird, in meters per second, in the first 3 seconds of flight?

Answer 1 meters per second

SCORE POINT 0

- 7** The graph below shows the time it took for a bird to fly from its nest to a bird feeder.



Using the information in the graph, describe what the bird is doing in the period between 3 seconds and 5 seconds after it left its nest.

It flying in a strater line

What is the speed of the bird, in meters per second, in the first 3 seconds of flight?

Answer 3 meters per second

Test 11—Question 7 Score Point 0

This response incorrectly describes what the bird is doing in the period between three seconds and five seconds after leaving its nest and incorrectly calculates the speed of the bird during its first three seconds of flight. Therefore, this response receives a Score Point 0.

Test 11—Question 8: The Living Environment

- 8** Describe TWO different ways that microorganisms, such as bacteria, can be HELPFUL to humans.

1) _____

2) _____

Key Elements:

Any two of the following:

- used in making of certain foods (e.g., cheese, bread, etc.)
- help people digest certain foods
- produce certain vitamins (i.e., vitamin K, certain B vitamins)
- used in making of certain medicines
- normal microorganisms in body help protect against disease-causing germs
- help provide nitrogen to crops/plants
- serve as decomposers in septic tanks/sewage treatment plants/food webs
- other valid way that microorganisms can be helpful to humans

Rubric:

2 points	Two key elements
1 point	One key element
0 points	Other

SCORE POINT 2	
8	Describe TWO different ways that microorganisms, such as bacteria, can be HELPFUL to humans.
1)	They strengthen our immune system
2)	Break down waste.

Test 11—Question 8 Score Point 2

This response correctly describes two different ways that microorganisms can be helpful to humans. The response receives a Score Point 2.

SCORE POINT 1	
8	Describe TWO different ways that microorganisms, such as bacteria, can be HELPFUL to humans.
1)	It could kill off other bacteria.
2)	

Test 11—Question 8 Score Point 1

This response correctly describes one way that microorganisms can be helpful to humans. However, the student does not give a second answer. Therefore, this response receives a Score Point 1.

SCORE POINT 0	
8	Describe TWO different ways that microorganisms, such as bacteria, can be HELPFUL to humans.
1)	It could be helpful to show us that it is bad for us.
2)	It could be helpful to us so we can understand what we could use it for and nothing would be harmed.

Test 11—Question 8 Score Point 0

This response does not correctly describe any ways that microorganisms can be helpful to humans. Therefore, this response receives a Score Point 0.

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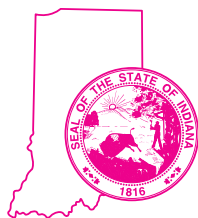
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Grade 7

Science

Fall 2007

Teacher's Scoring Guide



Indiana Department of Education